CLAIMS

What is claimed is:

1. A multiple band transceiver that allows for frequency scaling of an input signal while utilizing a reduced number of frequency sources, the transceiver comprising:

a first frequency source operative to generate a first oscillating signal;

a back-end transmitter mixer, electrically coupled to said first frequency source, operative to receive said first oscillating signal and an unmodulated transmit signal and to generate an Intermediate Frequency (IF) transmit signal;

a back-end receiver mixer, electrically coupled to said first frequency source, operative to receive said first oscillating signal and an IF receive signal and to generate an unmodulated receive signal;

a second frequency source operative to generate a second oscillating signal, wherein said second oscillating signal can correspond to a first band when said transceiver is operating in a first mode or a second band when said transceiver is operating in a second mode;

a front-end transmitter mixer electrically coupled to said second frequency source, operative to receive said second oscillating signal and said IF transmit signal, to produce a Radio Frequency (RF) transmit signal that corresponds to said first band when said transceiver is operating in said first mode and corresponds to said second band when said transceiver is operating in said second mode; and

a front-end receiver mixer electrically coupled to the second frequency source, operative to receive said second oscillating signal and an RF receive signal associated with said first band when said transceiver is operating in said first mode and associated with said second band when said transceiver is operating in said second mode, to generate said IF receive signal.

2. The multiple band transceiver of claim 1, wherein when operating in said first band, said front-end receiver mixer further comprises:

an RF receive input for receiving said RF receive signal, an IF receive output, and said front-end receiver mixer being operative to combine said RF receive signal with said second oscillating signal to produce said IF receive signal.

3. The multiple band transceiver of claim 1, wherein when operating in said first band, said back-end receiver mixer further comprises:

an IF receive input for receiving said IF receive signal associated with said first band, an unmodulated receive output, and said back-end receiver mixer being operative to combine said IF receive signal and said first oscillating signal to produce said unmodulated receive signal.

4. The multiple band transceiver of claim 1, wherein when operating in said first band, said back-end transmitter mixer further comprises:

an unmodulated transmit input for receiving said unmodulated transmit signal, an IF transmit output, and said back-end transmitter mixer being operative to combine said unmodulated transmit signal and said first oscillating signal to produce said IF transmit signal.

5. The multiple band transceiver of claim 1, wherein when operating in said first band, said front-end transmitter mixer further comprises:

an IF transmit input for receiving said IF transmit signal, an RF transmit output, and said front-end transmitter mixer being operative to combine said IF transmit signal corresponding to said first band and said second oscillating signal to produce said RF transmit signal corresponding to said first band.

6. The multiple band transceiver of claim 1, wherein when operating in said second band, said front-end receiver mixer further comprises:

an RF receive input for receiving said RF receive signal, an IF receive output, and said front-end receiver mixer being operative to combine said RF receive signal and said scaled second oscillating signal to produce said IF receive signal.

7. The multiple band transceiver of claim 1, wherein when operating in said second band, said back-end receiver mixer further comprises:

an IF receive input for receiving said IF receive signal, an unmodulated receive output, and said back-end receiver mixer being operative to combine said IF receive signal and said first oscillating signal to produce said unmodulated receive signal.

8. The multiple band transceiver of claim 1, wherein when operating in said second band, said back-end transmitter mixer further comprises:

an unmodulated transmit input for receiving said unmodulated transmit signal, an IF transmit output, and said back-end transmitter mixer being operative to combine said unmodulated transmit signal and said first oscillating signal to produce said IF transmit signal.

9. The multiple band transceiver of claim 1, wherein when operating in said second band, said front-end transmitter mixer further comprises:

an IF transmit input for receiving said IF transmit signal, an RF transmit output, and said front-end transmitter mixer being operative to combine said IF transmit and said a second oscillating signal to produce said RF transmit signal corresponding to said second band.

10. The dual band transceiver of claim 1, further comprising a programming mechanism which enables said second frequency source to be programmable to operate in said first and said second band.

11. The dual band transceiver of claim 1, wherein said first band is a cellular band and said second band is a PCS band.

12. The dual band transceiver of claim 1, wherein said first band is a GSM band and said second band is a DCS1800 band.

13. The dual band transceiver of claim 1, wherein the second oscillator is in a phase-locked loop configuration, and said phase-locked loop includes a voltage doubler device, for extending the tuning range of said second oscillator and reducing the signal to noise ratio.

14. A radio telephone, having a dual band receiver for operating in a first band and a second band, said dual band receiver comprising:

a first frequency source operative to generate a first oscillating signal;

a second frequency source operative to generate a second oscillating signal;

a front-end receiver mixer, having a Radio Frequency (RF) receive input for receiving an incoming RF receive signal, an oscillating signal input electrically coupled to said second frequency source and operative to receive said second oscillating signal when operating in said first band, a scaled oscillating signal input electrically coupled to said second oscillating signal through a scaler for receiving a scaled second oscillating signal when operating in said second band, and an Intermediate Frequency (IF) receive output for providing an IF receive signal generated by combining said incoming RF signal with said second oscillating signal when operating in said first band and for providing said IF receive signal generated by combining said incoming RF signal with said scaled second oscillating signal when operating in said second band; and

a back-end receiver mixer, having an IF receive input for receiving said IF receive signal, an oscillating input electrically coupled to said first frequency source and operative to receive said first oscillating signal, and an unmodulated receive output for providing an unmodulated receive signal generated by combining said IF receive signal with said first oscillating signal.

15. The radio telephone of claim 14, wherein said dual band receiver further comprises a programming mechanism which enables said receiver to be programmable to operate in said first band and said second band.

16. The radio telephone of claim 14, wherein said second frequency source further comprises a programming mechanism which enables said receiver to be programmable to operate in said first band and said second band.

17. The radio telephone of claim 14, wherein said first band is a cellular band and said second band is a PCS band.

18. The radio telephone of claim 14, wherein said first band is a GSM band and said second band is a DCS1800 band.

19. A radio telephone, having a dual band transmitter for transmitting in a first band and a second band, said dual band transmitter comprising:

a first frequency source operative to generate a first oscillating signal;

a second frequency source operative to generate a second oscillating signal;

a back-end transmitter mixer, having an unmodulated transmit input for receiving an unmodulated transmit signal, an oscillating signal input electrically coupled to said first frequency source and operative to receive said first oscillating signal, and an Intermediate Frequency (IF)transmit output for providing an IF transmit signal by combining said unmodulated transmit signal and said first oscillating signal; and

a front-end transmitter mixer, having an IF transmit input for receiving an IF transmit signal, an oscillating signal input electrically coupled to the second frequency source and operative to receive said second oscillating signal when operating in said first band, a scaled oscillating signal input electrically coupled to the second frequency source through a scaler and operative to receive a scaled second oscillating signal when operating in said second band, and an RF transmit output for providing an RF transmit signal generated by combining said IF transmit signal and said second oscillating signal when operating in said first band and for providing said RF transmit signal generated by combining said IF transmit signal and said scaled second oscillating signal when operating in said second band.

20. The radio telephone of claim 19, wherein said dual band transmitter further comprises a programming mechanism which enables said dual band transmitter to be programmable to operate in said first band and said second band.

21. The radio telephone of claim 19, wherein said second frequency source further comprises a programming mechanism which enables said dual band transmitter to be programmable to operate in said first band and said second band.

22. The radio telephone of claim 19, wherein said first band is a cellular band and said second band is a PCS band.

23. The radio telephone of claim 19, wherein said first band is a GSM band and said second band is one of the following bands:

(a) DCS1800 band;

(b) cellular band; and

(c) PCS band.

24. A radio telephone, having a dual band transceiver for transmitting and receiving in a first band and a second band, said first band and said second band each having a receive and a transmit channel, the dual band transceiver comprising:

a first frequency source operative to generate a first oscillating signal;

a first frequency scalar, having an oscillating signal input electrically coupled to said first frequency source for receiving said first oscillating signal, and a scaled oscillating signal output for providing a first scaled first oscillating signal;

a first transmitter mixer, having an unmodulated transmit input for receiving an unmodulated transmit signal, a first frequency scaler input electrically coupled to said first frequency scalar for receiving said first scaled first oscillating signal, and an IF transmit output generated by combining said unmodulated transmit signal and said first scaled first oscillating signal;

a second transmitter mixer, having an unmodulated transmit input for receiving an unmodulated transmit signal, a first frequency scaler input electrically coupled to said first frequency scalar for receiving said first scaled first oscillating signal having a 90 degree phase shift, and an IF transmit output for providing an IF transmit signal generated by combining said unmodulated transmit signal and said first scaled first oscillating signal with said 90 degrees phase shift;

a second frequency source operative to generate a second oscillating signal, wherein said second frequency source is programmable to operate in said first band and said second band;

a third transmitter mixer, having an IF transmit input electrically coupled to said first and said second mixer for receiving said IF transmit signal generated by summing said IF transmit signal from said first mixer and said second mixer, an oscillating signal input electrically coupled to said second frequency source for receiving said second oscillating signal when operating in said first band, and an RF transmit output for providing an RF transmit signal generated by combining said IF transmit signal and said second oscillating signal when operating in said first band;

a second frequency scalar, having an oscillating signal input electrically coupled to the second frequency source for receiving a second oscillating signal, and a scaled oscillating signal output for providing a scaled second oscillating signal; and

a fourth transmitter mixer, having an IF transmit input electrically coupled to said first and said second mixer for receiving said IF transmit signal generated by summing said IF transmit signal from said first mixer and said second mixer, a oscillating signal input electrically coupled to said second frequency source through said second frequency scaler for receiving said scaled second oscillating signal when operating in said second band, and an RF transmit output for providing an RF transmit signal generated by combining said IF transmit signal and said scaled second oscillating signal when operating in said second band.

25. The radio telephone of claim 24, wherein said dual band transceiver further comprises:

a first receiver mixer, having a Radio Frequency (RF) receive input for receiving an RF receive signal input, an oscillating signal input electrically coupled to said second frequency source for receiving said second oscillating signal when operating in said first band, an IF receive output for providing a first IF receive signal generated by combining said second oscillating signal with said RF receive signal when operating in said first band;

a second receiver mixer, having a Radio Frequency (RF) receive input for receiving an RF receive signal, an oscillating signal input electrically coupled to said second scaler for receiving said scaled second oscillating signal when operating in said second band, an IF receive output for providing an IF receive signal generated by combining said scaled second oscillating signal with said RF receive signal when operating in said second band;

a third frequency scaler, having an oscillating signal input electrically coupled to said first frequency source for receiving said first oscillating signal, and a scaled first oscillating signal output for providing a second scaled first oscillating signal;

a third receiver mixer, having a scaled oscillating signal input electrically coupled to said third frequency scaler for receiving said second scaled first oscillating signal, an IF receive input for receiving said first IF receive signal, and a second IF receive output for providing a second IF receive signal generated by combining said second scaled first oscillating signal and said first IF receive signal;

a fourth frequency scaler, having an oscillating signal input electrically coupled to said first frequency source for receiving a first oscillating signal, a scaled oscillating signal output for providing a third scaled first oscillating signal;

a fourth receiver mixer, having a second IF input electrically coupled to said third receiver mixer for receiving said second IF signal, an oscillating signal input electrically coupled to said fourth frequency scaler for receiving said third scaled first oscillating signal, and an unmodulated receive output for providing an unmodulated receive signal generated by combining said second IF signal and said third scaled first oscillating signal; and

a fifth receiver mixer, having a second IF input electrically coupled to said third receiver mixer for receiving said second IF signal, an oscillating signal input electrically coupled to said fourth frequency scaler for receiving said third scaled first oscillating signal having a 90 degree phase shift, and an unmodulated receive output for providing an unmodulated receive signal generated by combining said second IF signal and said third scaled first oscillating signal having said 90 degree phase shift.

26. The dual band transceiver of claim 25, further comprising a programming mechanism which enables said receiver to be programmable to operate in the first and the second band.

27. The dual band transceiver of claim 25, wherein said second frequency source further comprises a programming mechanism which enables said receiver to be programmable to operate in the first and the second band.

28. The dual band transceiver of claim 25, wherein said first band is a cellular band and said second band is a PCS band.

29. The radio telephone of claim 25, wherein said first band is a GSM band and said second band is one of the following bands:

(a) DCS1800 band;

(b) cellular band; and

(c) PCS band.

30. A method of operating a dual band transceiver device that allows for frequency scaling of a signal while utilizing a reduced number of frequency sources, the method comprising:

generating a first oscillating signal;

generating a second frequency signal;

if said dual band transceiver device is operating in said first band, further performing the following steps:

receiving an unmodulated transmit signal;

generating an IF transmit signal by combining said unmodulated transmit signal and said first oscillating signal;

generating an RF transmit signal corresponding to said first band by combining said IF transmit signal and said first oscillating signal;

receiving a Radio Frequency (RF) receive signal;

generating an IF receive signal by combining said RF receive signal with said second frequency signal;

generating an unmodulated receive signal by combining said IF receive signal and said first oscillating signal;

if said dual band transceiver device is operating in said second band, further performing the following steps:

receiving an unmodulated transmit signal;

generating an IF transmit signal by combining said unmodulated transmit signal and said first oscillating signal;

generating an RF transmit signal associated with said second band by combining said IF transmit signal and said scaled second oscillating signal;

receiving an RF receive signal;

generating a scaled second frequency signal by scaling said second frequency signal;

generating an IF receive signal by combining said RF receive signal with said scaled second frequency signal; and

generating an unmodulated receive signal by combining said IF receive signal and said first oscillating signal.